

## ABSTRACT

Apparatus and methods are provided for interacting light with particles, including but not limited to biological matter such as cells, in unique and highly useful ways. Optophoresis consists of subjecting particles to various optical forces, especially optical gradient forces, and more particularly moving optical gradient forces, so as to obtain useful results. In biology, this technology represents a practical approach to probing the inner workings of a living cell, preferably without any dyes, labels or other markers. In one aspect, a method is provided for separating a population of particles according to size by subjecting the particles to an optical gradient pattern having a defined spatial periodicity and moving the gradient relative to the particles, wherein the improvement comprises selecting the spatial periodicity of the gradient to have a differential effect on differently sized particles.